WHAT IS CLAIMED IS:

1. An electric power steering device for controlling the output of a motor that applies an auxiliary steering force to the steering mechanism from a current reference value calculated based on a steering torque signal generated in at least the steering shaft, said device comprising:

a duty ratio calculator for calculating a duty ratio D1 and a duty ratio D2 determined by the motor terminal voltage based on said current reference value; and

a motor drive circuit including a motor connected across the output terminals and a power supply connected across the inputted terminals of an H bridge circuit made up of a first arm and a second arm each containing a pair of semiconductor devices connected in series, a PWM signal for duty ratio D1 driving said semiconductor device in the upper stage of said first arm, and a PWM signal for a duty ratio D2 driving said semiconductor device in the lower stage of said second arm of said H bridge circuit,

wherein said duty ratio calculator calculates said duty ratio D1 and said duty ratio D2 showing the motor current characteristics for a duty ratio D as a continuous linear characteristic from said current reference value based on a specified calculation formula.

2. An electric power steering device according to claim 1, wherein said duty ratio calculator calculates said duty ratio D1 and said duty ratio D2 separately based on the back electromotive force of motor to show motor current characteristics for said duty ratio as continuous linear characteristics.

3. An electric power steering device for controlling the output of a motor that applies an auxiliary steering force to the steering mechanism from a current reference value calculated based on a steering torque signal generated in at least the steering shaft, said device comprising:

a duty ratio calculator for calculating a duty ratio D1 and a duty ratio D2 determined by the motor terminal voltage based on said current reference value; and

a motor drive circuit including a motor connected across the output terminals and a power supply connected across the input terminals of an H bridge circuit made up of a first arm and a second arm each containing a pair of semiconductor devices connected in series, a PWM signal for duty ratio D1 driving said semiconductor device in the upper stage of said first arm, and a PWM signal for a duty ratio D2 driving said semiconductor device in the lower stage of said second arm of said H bridge circuit,

wherein, when the following condition (c) is satisfied for the absolute voltage of the motor terminal voltage command value V_{ref} and the absolute value $K_T\omega$ of the motor back electromotive force,:

$$|V_{ref}| < |K_T\omega| \;\ldots\ldots\ldots\; (c)$$

then said duty ratio calculator calculates said duty ratio D1 from the following formula (a), and said duty ratio D2 from the following formula (b):

$$D1 = V_{ref2}/Vr \;\ldots\ldots\ldots\; (a)$$

$$D2 = \{V_{ref2} + \mathrm{sign}\,(V_{ref2})\;(Vr - |K_T\omega|)\}/Vr \;\ldots\ldots\; (b)$$

Here, V_{ref}: motor terminal voltage command value

V_{ref2}: linear motor terminal voltage command value

$= 1/2\ (V_{ref} - K_T\omega)$

Vr: Voltage supplied to motor (battery voltage)

K_T: = Motor back electromotive force constant

ω: Motor angular velocity

sign(V_{ref2}): reference symbol for linear motor terminal voltage command value V_{ref2}.

4. An electric power steering device according to claim 3, wherein the following condition

$$|V_{ref}| < |K_T\omega| \;\ldots\ldots\ldots\; (d)$$

is satisfied for the absolute value of said motor terminal voltage command value V_{ref} and the absolute value of said back

electromotive force $K_T\omega$ after removing their respective noise components, then said duty ratio calculator can calculate said duty ratio D1 from said formula (a), and said duty ratio D2 from said formula (b).

5. An electric power steering device according to claim 3, wherein the following condition

$$|V_{ref}| < |K_T\omega| \quad \ldots\ldots\ldots \quad (e)$$

including a hysteresis characteristic is satisfied for the absolute value of said motor terminal voltage command value V_{ref} and the absolute value of said motor back electromotive force $K_T\omega$ after removing their respective noise components, then said duty ratio calculator can calculate said duty ratio D1 from said formula (a), and said duty ratio D2 from said formula (b).

6. An electric power steering device according to claim 3, wherein following condition

$$(|V_{ref}| - |K_T\omega|) < -Hys \quad \ldots\ldots\ldots \quad (f)$$

(Hys: hysteresis width characteristics value)

is satisfied for the absolute value of said motor terminal voltage command value V_{ref} and absolute value of said back electromotive force $K_T\omega$ of motor with their respective noise components removed, then said duty ratio calculator can

calculate said duty ratio D1 from formula (a), and said duty ratio D2 from formula (b); and the previous decision results can be maintained when the following condition

$$- Hys < (|V_{ref}| - |K_T \omega|) < Hys \quad \ldots\ldots \quad (g)$$

is satisfied.

7. An electric power steering device according to claim 5 or claim 6, wherein said hysteresis width characteristic value Hys is determined according to the size of the noise.

8. An electric power steering device according to any of claim 3 through claim 6, wherein said duty ratio calculator includes a current drive linearity compensator and a current discontinuity compensator, and said current drive linearity compensator calculates said duty ratio D1 for said linear motor terminal voltage command value V_{ref2} from the input of said motor terminal voltage command value V_{ref} based on said formula (a); and said current discontinuity compensator calculates said duty ratio D2 from the input of said linear motor terminal voltage command value V_{ref2} based on said formula (b).